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**Acoustics — Laboratory tests on noise emission from appliances and equipment used in water supply installations —
Part 3: Mounting and operating conditions for in-line valves and appliances**

Acoustique — Mesurage en laboratoire du bruit émis par les robinetteries et les équipements hydrauliques utilisés dans les installations de distribution d'eau — Partie 3: Conditions de montage et de fonctionnement des robinetteries et des équipements hydrauliques en ligne

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Foreword

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Acoustics — Laboratory tests on noise emission from appliances and equipment used in water supply installations —

Part 3: Mounting and operating conditions for in-line valves and appliances

0 Introduction

The method of measurement for laboratory tests on noise emission from appliances and equipment used in water supply installations is specified in ISO 3822/1.

This part of ISO 3822 gives detailed descriptions for mounting and operating in-line valves and appliances, which control the flow, pressure or temperature of the water in water supply installations in such laboratory tests.

NOTE — An in-line valve is one through which water flows and which is permanently installed in a system of rigid pipework upstream of the outlet fitting.

These in-line valves and appliances are for use with cold and/or hot water in buildings (stopcocks, check valves, in-line thermostatic valves, domestic water meters, valve combinations for installation in water heater feed pipes, pressure reducing valves, flow restrictors, water governors, mechanically operated mixing valves, service valves, in-line temperature and pressure relief valves, etc.).

1 Scope and field of application

This part of ISO 3822 specifies the mounting and operating conditions to be used for in-line valves and appliances which control the flow, pressure or temperature of the water in water supply installations, when measuring noise emission resulting from water flow.

It is applicable to in-line valves and appliances of maximum nominal size DN 32¹⁾ and to systems in which the maximum water flow rate does not exceed 2 l/s.

The procedures described are for general use for all types of in-line valves of conventional design.

2 References

ISO 7/1, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Designation, dimensions and tolerances.*

ISO 49, *Malleable cast iron fittings threaded to ISO 7/1.*

ISO 274, *Copper tubes of circular section — Dimensions.*

ISO 3822/1, *Acoustics — Laboratory tests on noise emission from appliances and equipment used in water supply installations — Part 1: Method of measurement.*

ISO 6708, *Pipe components — Definition of nominal size.*

3 Mounting

3.1 General

In-line valves shall be inserted between two straight pieces of pipe of the type and sizes appropriate to the end-connections of the valve. Each straight piece of pipe shall be at least ten diameters long.

3.1.1 Installation

The in-line valve or appliance shall be installed in its normal working position, which is generally vertical or horizontal.

The test shall be carried out for the noisiest of the two positions, which shall be determined by a rapid test.

If the manufacturer specifies that the appliance may be installed in other positions, then the rapid test shall also be carried out for these positions.

1) See ISO 6708; DN is the symbol for "nominal size". The number of the nominal size is loosely related to the inside diameter (in millimetres) of the in-line valves and appliances.

3.1.2 Connection

The in-line valve or appliance shall be connected to the test pipe in accordance with the appropriate description in 3.3 to 3.7. The coupling shall be made so that no air will be trapped therein.

In-line valves or appliances fitted with connections not covered by 3.3 to 3.5 inclusive shall be connected to the test pipe and to the discharge system so as to provide a rigid and watertight connection in accordance with good practice and workmanship.

3.2 Fitting to the test pipe

The test pipe shall have an external thread R 1 in accordance with ISO 7/1 and shall end with a galvanized union, taper seat 1, U12. Depending on whether the position of the in-line valve or appliance is horizontal or vertical, it shall be connected to the test pipe by means of a galvanized long sweep bend 1, G1 or G4, and/or a galvanized bushing N4 pattern I or II, together with a galvanized reducing socket, M2 or M4, if necessary. All fittings shall comply with the requirements of ISO 49.

3.3 Mounting of in-line valves and appliances with screwed connections

In-line valves and appliances with screwed connections for galvanized pipes (see 3.1) shall be connected to the test pipe as specified in 3.2.

3.4 Mounting of in-line valves and appliances with provision for soldering in copper connecting pipes

In-line valves and appliances with provision for soldering in copper connecting pipes shall have a piece of copper pipe of the appropriate diameter and at least ten diameters in length, though not more than 300 mm, soldered in each connection. This copper pipe shall be connected to the test pipe as specified in 3.2 and 3.5.

3.5 Mounting of in-line valves and appliances fitted with copper connecting pipes

In-line valves and appliances fitted with copper connecting pipes, which shall be extended, if necessary, to at least ten diameters in length, though not more than 300 mm, shall be connected to the test pipe, as specified in 3.2, using couplings made either by soldering a nipple on to the pipe and using a cap nut or by means of a compression fitting.

3.6 Mounting of in-line valves or appliances with two inlets

In-line valves or appliances with two inlets shall be connected to the test pipe, as specified in 3.3, 3.4 or 3.5, by means of a twin outlet (see ISO 3822/1).

3.7 Discharge connection

The discharge system specified in 4.1.4 shall be connected to the outlet of the in-line valve or appliance by one of the methods specified in 3.3 to 3.5.

4 Test procedure

4.1 General test conditions

4.1.1 General

In-line valves and appliances shall be tested by the method specified in ISO 3822/1.

4.1.2 Water temperature

All in-line valves and appliances, including those which are normally operated with both hot and cold water, shall be tested with water at a temperature not exceeding 25 °C at all inlets.

4.1.3 Outlets

In-line valves and appliances with more than one outlet shall be tested for each outlet separately. The unused outlet(s) shall be closed by a drain cock for venting the valve or appliance.

4.1.4 Flow regulating and discharge system

In-line valves and appliances shall be tested with an adjustable low noise flow resistance connected downstream of the valve.

The noise produced by this flow resistance, including the intrinsic noise of the test arrangement, shall be lower than that of the appliance to be tested by at least 10 dB. An example of such a low noise flow resistance is given in the annex.

If the specified water flow rate cannot be obtained by adjusting the low noise flow resistance connected to the valve under test, the flow resistance shall be replaced by 1 m of smooth bore flexible hose of the same bore as the outlet of the valve.

4.1.5 Test pressures

The procedures specified in 4.2, 4.3, 4.4, 4.6 or 4.7 shall be carried out at a flow pressure of 0,3 MPa¹⁾ and then at a flow pressure of 0,5 MPa, without altering the specified setting of the adjustable flow resistance. If required, the test shall be repeated, without altering the specified setting of the adjustable flow resistance, at flow pressures of 0,1, 0,2 and 0,4 MPa.

1) 1 MPa = 10 bar

4.2 Procedure for stop valves

4.2.1 For stop valves and appliances having an external control which stops the flow, operate this control so that the maximum water flow rate is obtained.

4.2.2 Adjust the water flow pressure (see 4.1.5) at the inlet and keep this pressure constant at this value throughout the following steps.

4.2.3 Adjust the low noise flow resistance which is connected to the stop valve so that the water flow rate specified in table 1 is obtained.

Table 1 — Water flow rates

Nominal size of in-line valve or appliance	Water flow rate at 0,3 MPa
	l/s
DN 10	0,20
DN 15	0,50
DN 20	0,80
DN 25	1,30
DN 32	2,00

For service valves which are installed before draw-off taps for wash basins, sinks and bidets, the water flow rate shall be adjusted to 0,25 and/or 0,42 l/s.

4.2.4 Measure the water flow rate and the sound pressure level in the test room.

4.3 Procedure for control valves

4.3.1 For control valves having an external control which regulates and stops the flow, carry out the procedure specified in 4.2.

4.3.2 Operate (close) the control until the flow of water has stopped. Determine the maximum sound pressure level during this closing procedure and measure the water flow rate at which this maximum occurs.

4.4 Procedure for valves and appliances operated by water flow

NOTE — For valves and appliances operated by water flow (for example water meters, check valves, combined check and stop valves), the flow rate during the test depends on the water flow pressure and the setting of the low noise flow resistance.

4.4.1 Adjust the water flow pressure (see 4.1.5) at the inlet and keep the pressure constant at this value throughout the following steps.

4.4.2 Adjust the low noise flow resistance which is connected to the valve or appliance so that the water flow rate specified in table 1 is obtained.

4.4.3 Measure the water flow rate and the sound pressure level in the test room.

4.4.4 Adjust the low noise flow resistance until the flow of water has stopped. Determine the maximum sound pressure level during this closing procedure and measure the water flow rate at which this maximum occurs.

4.5 Procedure for automatic in-line valves or appliances operated by water pressure

NOTE — For in-line valves or appliances which are operated by water pressure (for example pressure reducing valves and pressure limiting valves) the water flow rate during the test depends on the inlet and outlet pressures and the setting of the low noise flow resistance.

4.5.1 For valves intended for use over a range of inlet and/or outlet pressures, maintain the inlet pressure at 0,8 MPa. Set the outlet pressure adjustment, if any, at 0,3 MPa, if this pressure is within the range of outlet pressures. Otherwise set the outlet pressure adjustment, if any, at 0,1 MPa.

4.5.2 Fully open the low noise flow resistance which is connected to the pressure reducing valve. Then adjust simultaneously the outlet pressure to 0,3 MPa or 0,1 MPa and the water flow rate to the appropriate value given in table 2.

Carry out the tests at water flow rate Q_1 and, if required, also at water flow rate Q_2 .

Table 2 — Water flow rates

Nominal size of in-line valve or appliance	Water flow rate at 0,3 MPa	
	Q_1 l/s	Q_2 l/s
DN 10	0,20	0,15
DN 15	0,50	0,38
DN 20	0,80	0,60
DN 25	1,30	1,00
DN 32	2,00	1,50

4.5.3 Measure the upstream and downstream pressures, the water flow rate and the sound pressure level in the test room.

4.5.4 Adjust the low noise flow resistance until the flow of water has stopped. Determine the maximum sound pressure level during this closing procedure and measure the water flow rate at which this maximum occurs.

4.6 Procedure for automatic in-line valves and appliances operated by water temperature

NOTE — For automatic in-line valves and appliances which are operated by water temperature (for example thermostatic mixing valves), the water flow rate during the test depends on the water flow pressure and the setting of the low noise flow resistance.

4.6.1 Set the temperature control, if any, to its cold setting. Adjust the water flow pressure (see 4.1.5) at the inlet and keep the pressure constant at this value throughout the following steps.

4.6.2 Adjust the low noise flow resistance which is connected to the valve under test so that the water flow rate specified in table 1 is obtained.

4.6.3 Measure the water flow rate and the sound pressure level in the test room.

4.6.4 Operate the temperature control, if any, over the whole of its range in both directions, returning it to its cold setting. Determine the maximum sound pressure level in the test room during this procedure and the water flow rate at which this maximum occurs.

NOTE — If the item under test is not fitted with a temperature control, this procedure is not applicable.

4.7 Procedure for "safety groups"

NOTE — Various combinations of in-line valves are used in cold feed pipes to unvented water heaters. When these are incorporated together into a single unit, this unit is known as a "safety group". Such safety groups typically incorporate stop valves, check valves, pressure relief valves, pressure reducing valves and pressure gauges in various combinations.

4.7.1 Safety groups without a pressure reducing valve

Safety groups which do not include a pressure reducing valve shall be tested as described in 4.2.

4.7.2 Safety groups with a pressure reducing valve

Safety groups which include a pressure reducing valve shall be tested as described in 4.5 with any stop valves or flow regulators fully open.

5 Test report

The test report shall include the following information:

- a) the information required by ISO 3822/1;
- b) the mounting of the appliance tested;
- c) the flow pressure and water flow rates used, the outlet used and the sound pressure levels obtained;
- d) a description of the in-line valve or appliance tested, including the type, nominal size, manufacturer and manufacturer's number;
- e) the number of the clauses of this part of ISO 3822 relevant to the in-line valve or appliance tested, and in accordance with which the tests were carried out, together with descriptions of any peculiarities observed.

Annex

Example of a low noise flow resistance

(This annex does not form an integral part of the standard.)

A flow resistance with an adjustable flow rate comprises a smooth bore, braided rubber hose (pressure hose) of length at least 1,5 m. The far end of this hose is connected to a low noise flow control valve, if necessary via a muffler for water-borne noise. Depending on the connection of the in-line valve or appliance under test, a rubber hose of appropriate internal diameter, with a hose connector R 1 or R 3/4 and suitable fittings may be used.